

Assessment of Continuous Oil Resources in the Wolfcamp Shale of the Midland Basin, Permian Basin Province, Texas, 2016

Open File-Report 2017–1013

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By Stephanie B. Gaswirth

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**U.S. Department of the Interior
U.S. Geological Survey**

U.S. Geological Survey
William H. Werkheiser, Acting Director

U.S. Geological Survey, Reston, Virginia: 2017

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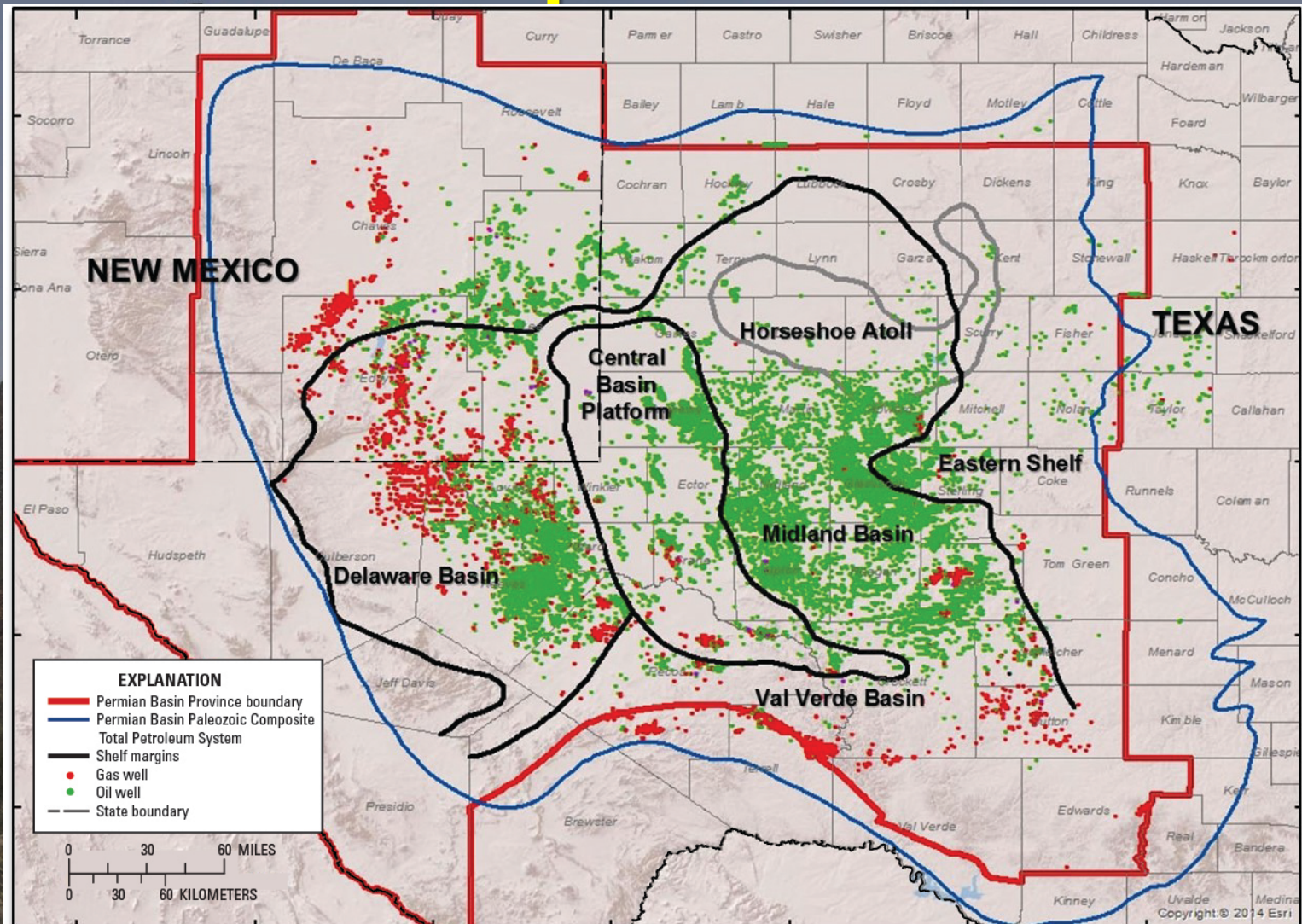
Stephanie B. Gaswirth
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Assessment of the Wolfcamp Shale

- Not assessed for continuous (unconventional) resources prior to this assessment
- Production historically from vertical wells exploiting the “Wolfberry” play with a shift to horizontal wells targeting the organic-rich shale of the Wolfcamp
- More than 3,000 horizontal wells drilled in the Wolfcamp shale of the Midland Basin

Wolfcamp Production



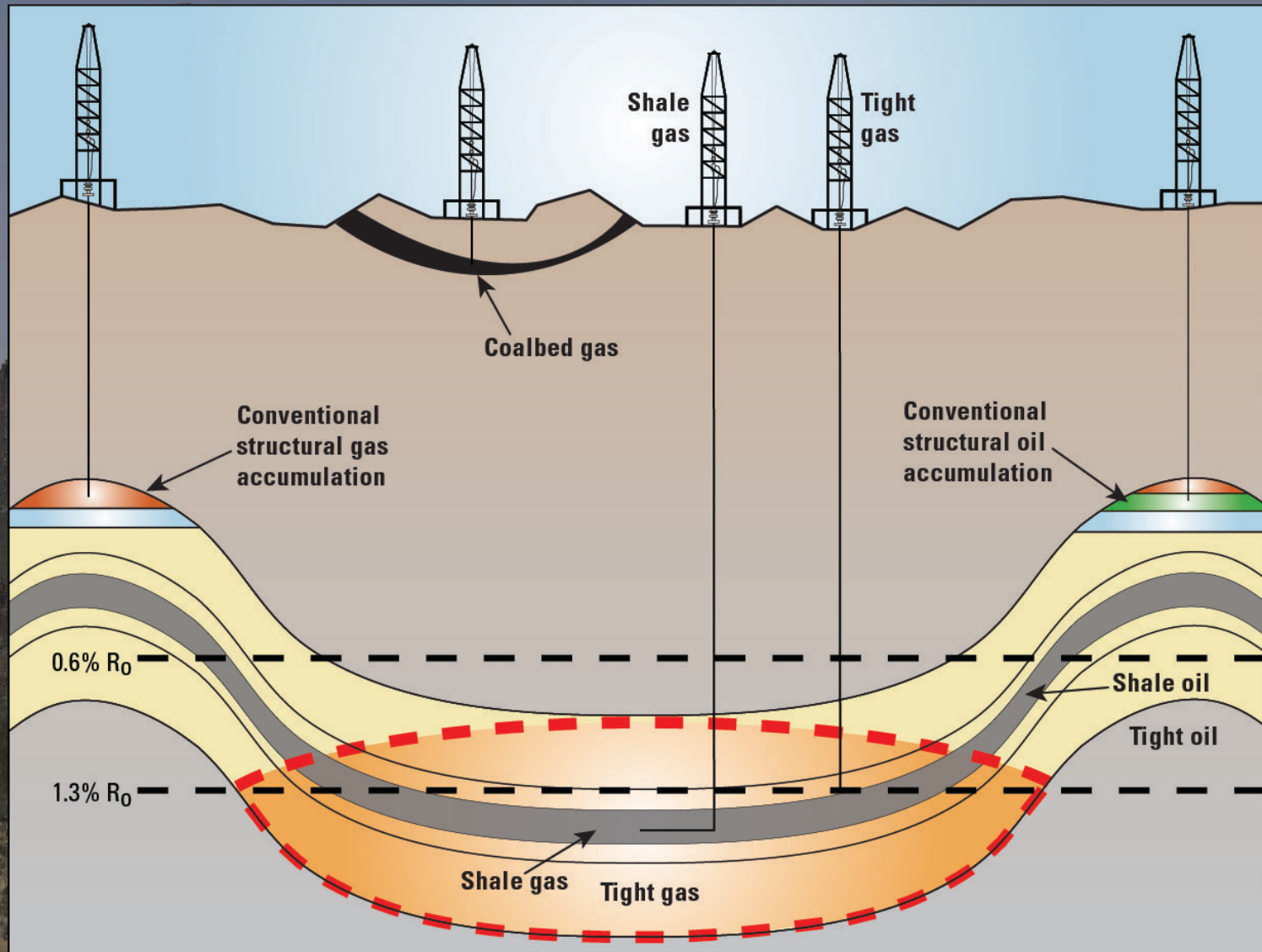
Wolfcamp by the Numbers

- 7 billion barrels of oil (BBO) consumption by the United States annually¹
- Texas is the largest producer of oil in the United States¹
- Production to date (as of November 2016):²
 - Wolfcamp Shale, Permian Basin Province: 1.3 BBO
 - Wolfcamp Shale, Midland Basin: 442 million barrels of oil (MMBO)

¹U.S. Energy Information Administration, 2016

²IHS Markit™, 2016

Conventional versus Continuous Resources

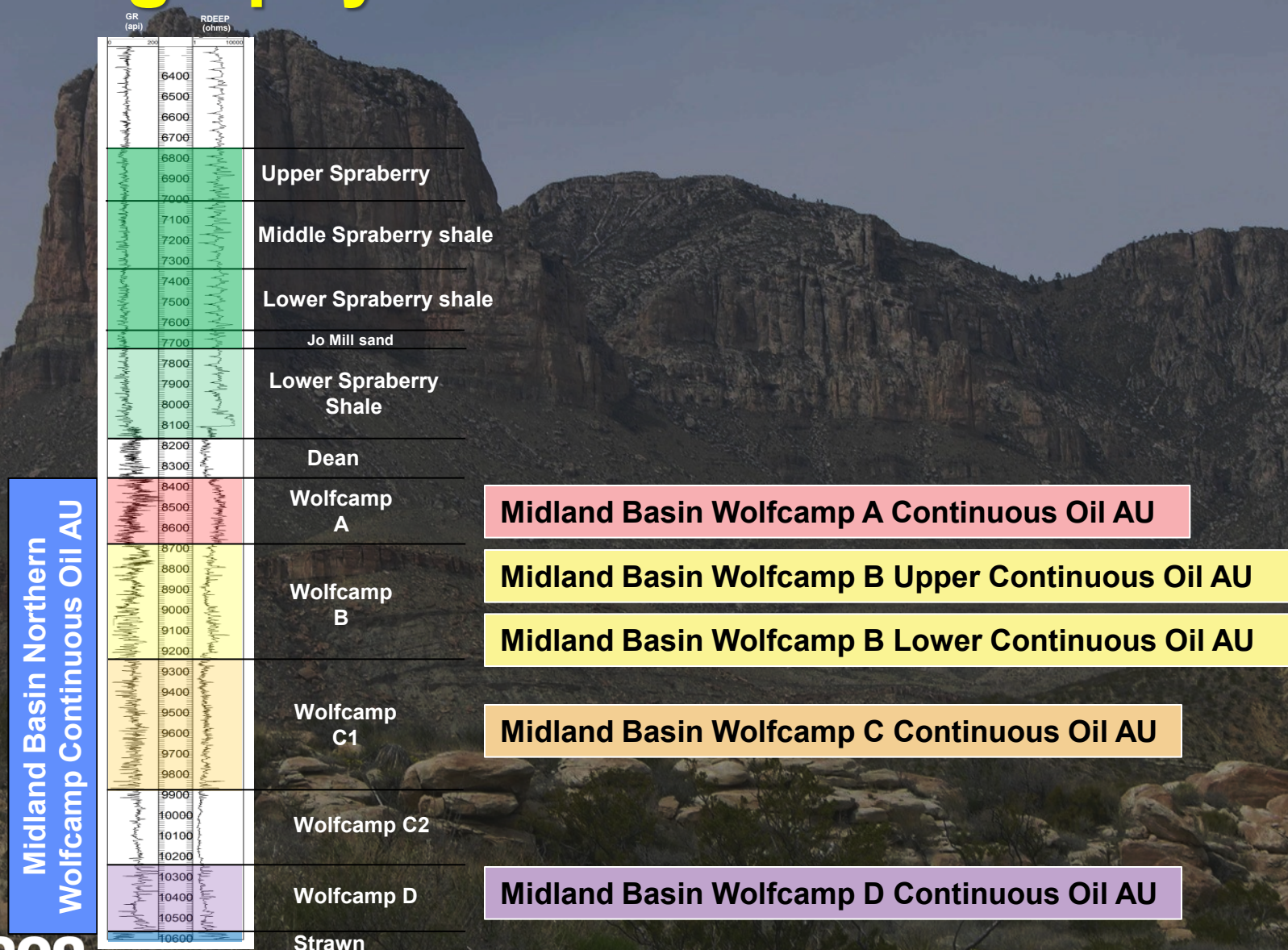


[%, percentage; R_0 , vitrinite reflectance]

USGS Assessment Methodology For Continuous-Type Accumulations

- Based on geology and geologic models
- Identify and outline Total Petroleum System(s) and Assessment Units
- Undiscovered, technically recoverable resources
 - Not economically recoverable resource estimates
 - Not in-place resource estimates
 - Not reserves

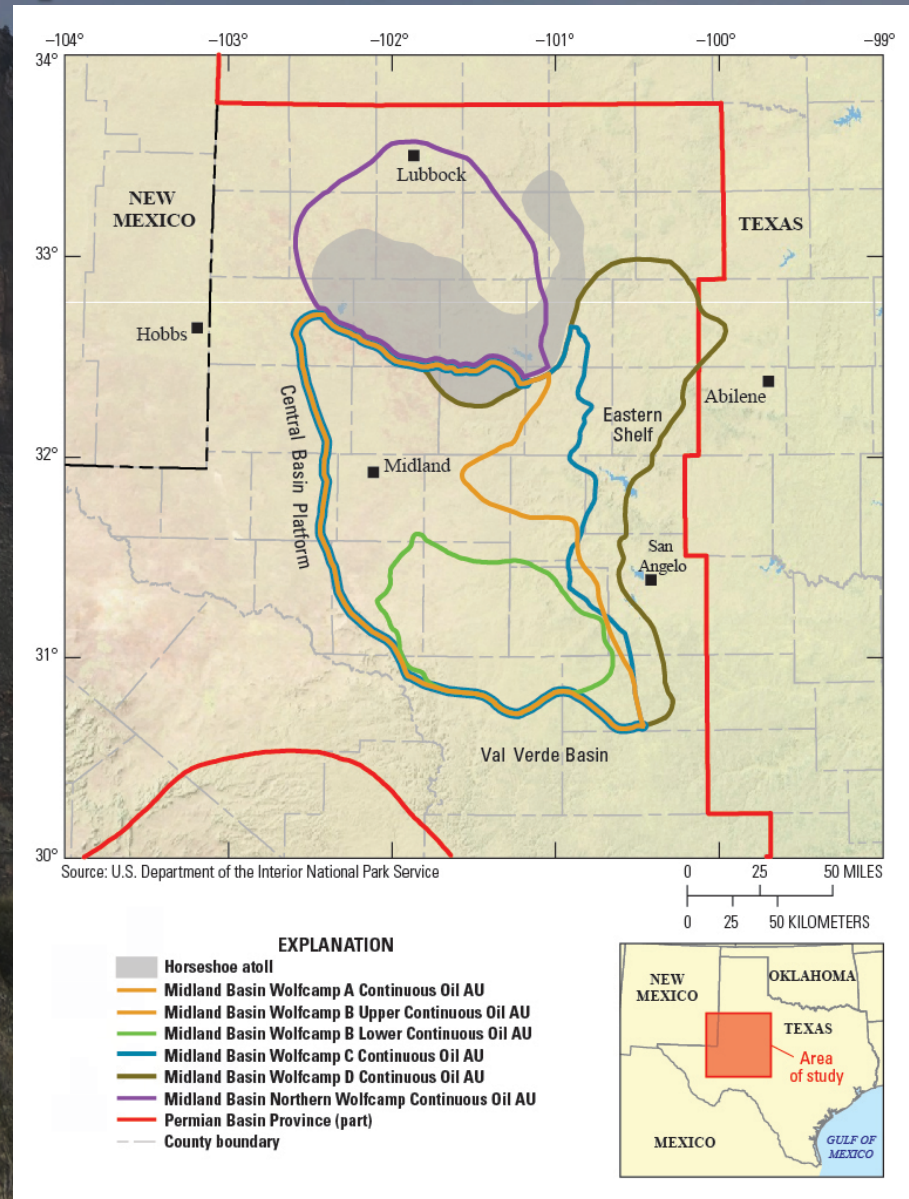
Stratigraphy and Assessment Units



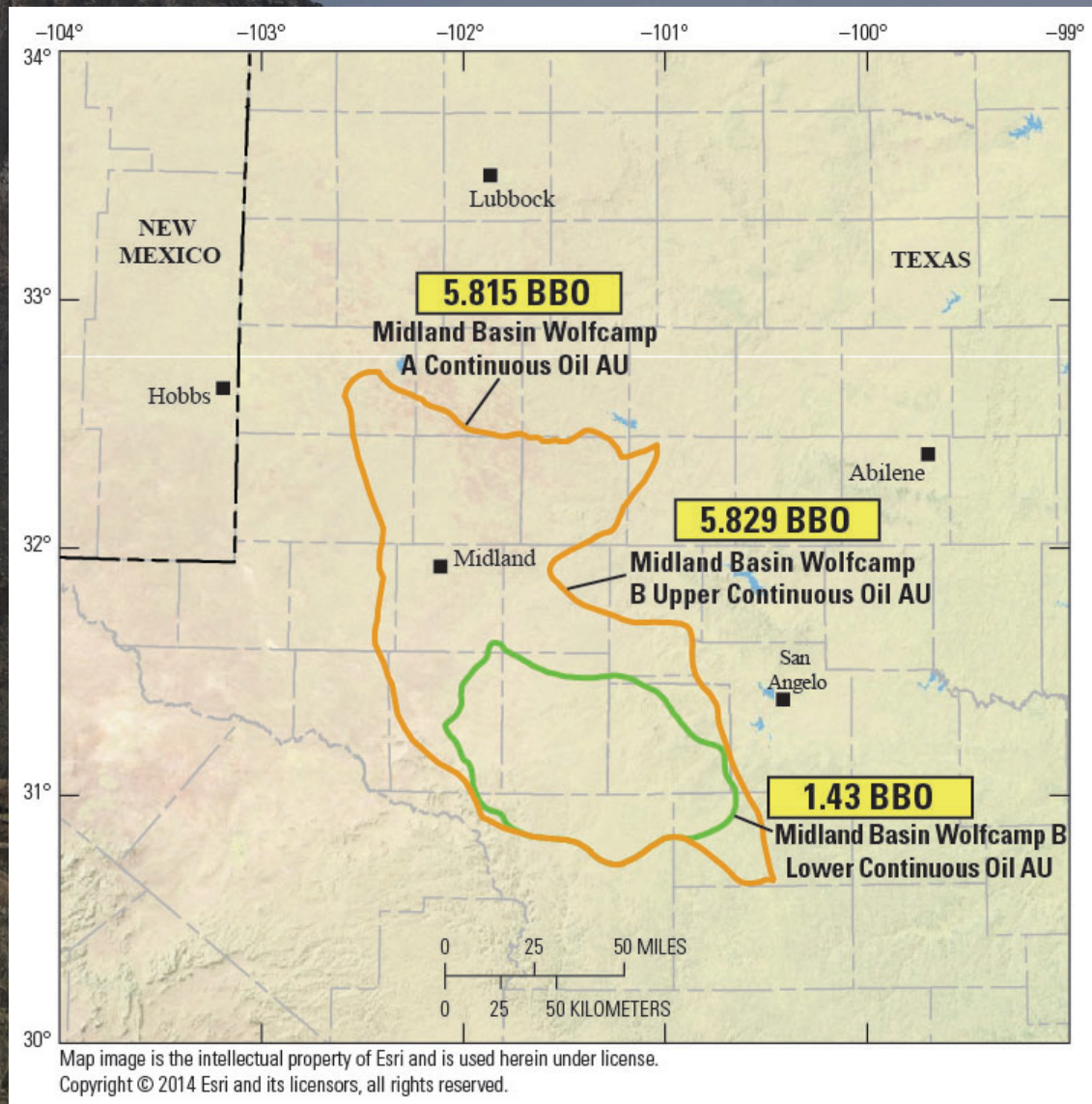
Pioneer Resources, 2017, Midland Basin Type Log, NW Reagan County, Texas, used with permission

[GR, gamma ray; api, unit of counting rate for gamma ray curves; RDEEP, resistivity, deep; ohms, unit of electrical resistivity; AU, assessment unit]

Wolfcamp Shale Assessment Units

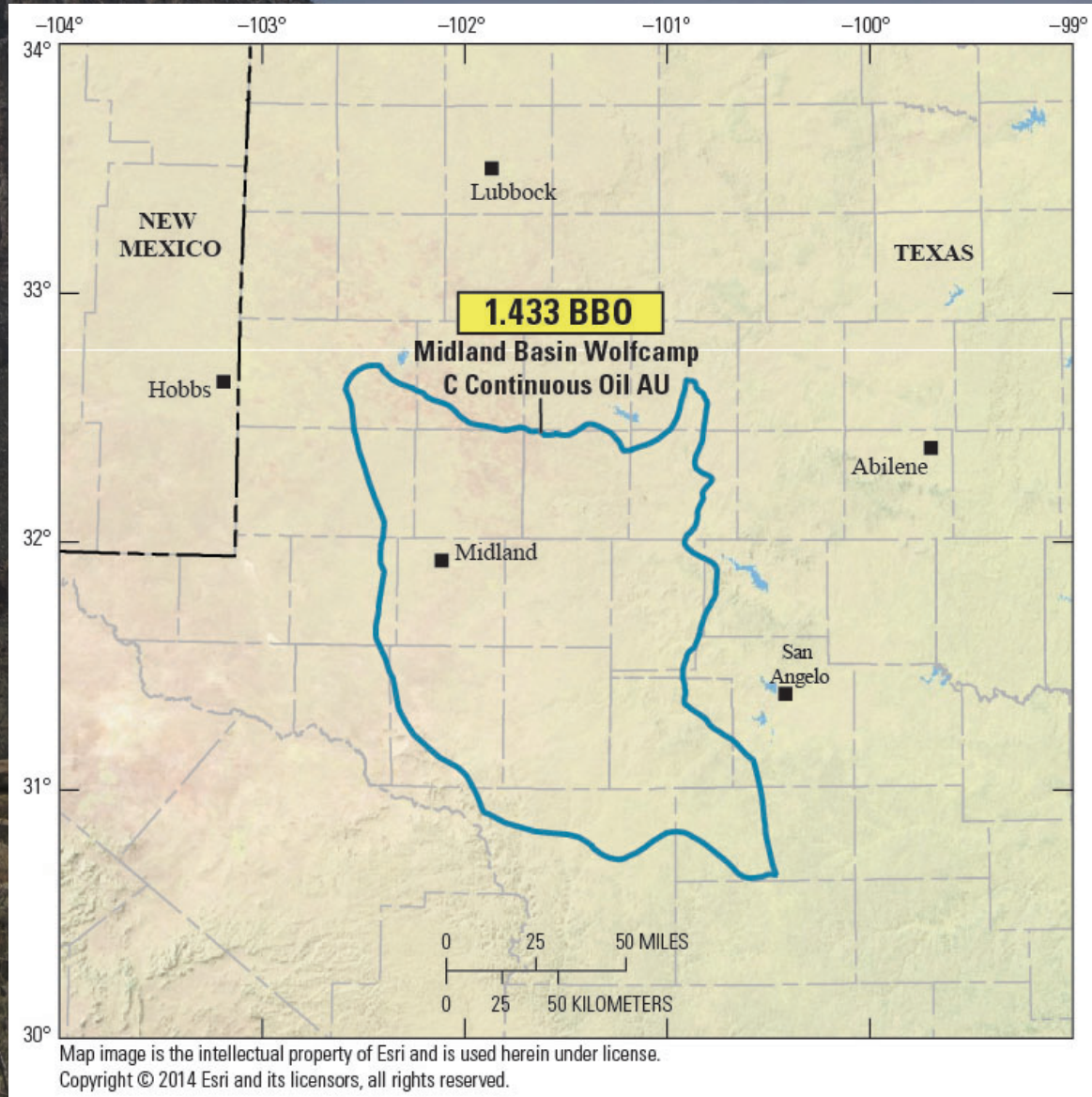


Wolfcamp Shale Mean Assessment Results Per Assessment Unit



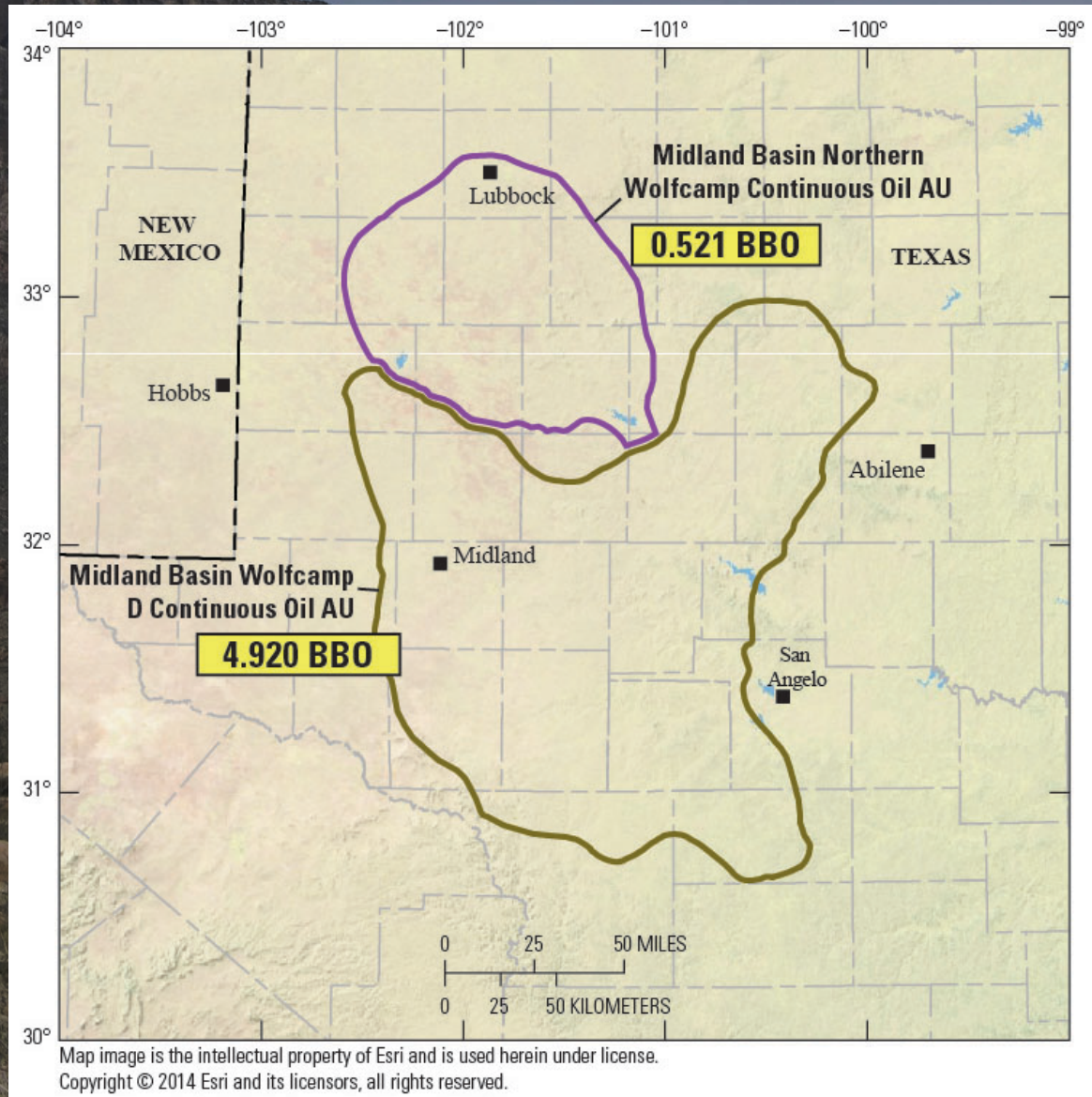
[AU, assessment unit; BBO, billion barrels of oil]

Wolfcamp Shale Mean Assessment Results Per Assessment Unit



[AU, assessment unit; BBO, billion barrels of oil]

Wolfcamp Shale Mean Assessment Results Per Assessment Unit



[AU, assessment unit; BBO, billion barrels of oil]

Midland Basin Wolfcamp Shale

Assessment Summary

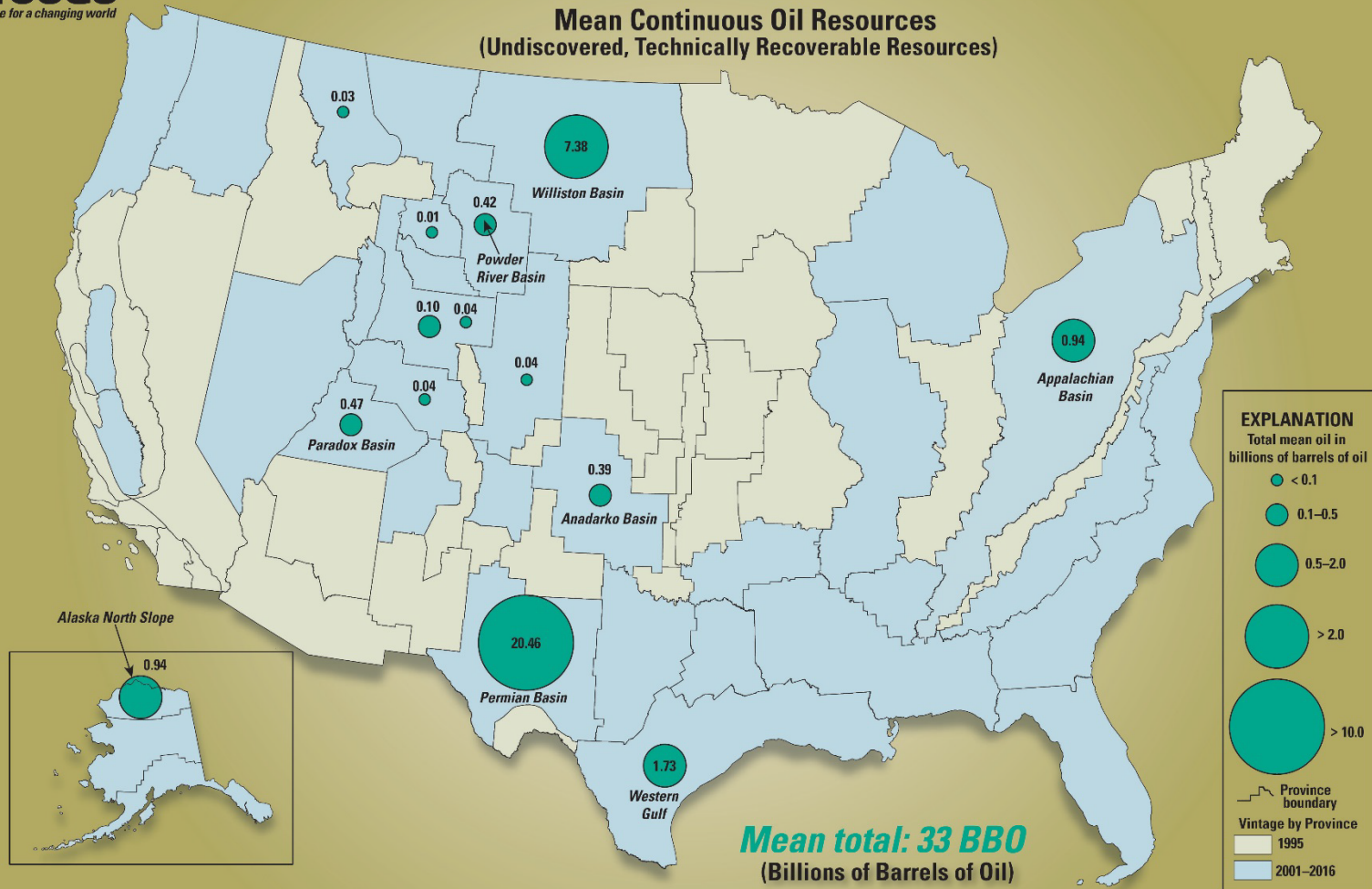
Undiscovered, technically recoverable resources

Continuous mean oil resources (6 assessment units)

- Oil: 20 billion barrels of oil (BBO)
- Associated gas: 16 trillion cubic feet of gas
- Natural gas liquids: 1.6 billion barrels natural gas liquids

20 BBO (F95-F5 range from 11.4 BBO to 31.5 BBO)

Wolfcamp Shale of the Midland Basin: Largest Continuous Oil Accumulation Assessed by the USGS



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References

- IHS Markit™, 2016, US Well History and Production Database: Englewood, Colo., IHS Markit, accessed August 2016 at <http://www.ihsenergy.com>. [Also available from IHS Markit, 15 Inverness Way East, Englewood, CO 80112.]
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